

# PATENT SPECIFICATION

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## COMPLETE SPECIFICATION

### DRAWINGS ATTACHED

### Liquid Level Sensing Units

We, GENERAL MOTORS CORPORATION, a Company incorporated under the laws of the State of Delaware, in the United States of America, of Grand Boulevard, in the City of Detroit, State of Michigan, in the United States of America (Assignees of RICHARD BRUCE COLEMAN and NEAL EDWARD NEESE) do hereby declare the invention for which we pray that a patent may be granted to us and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to liquid level indicators and more particularly to sensing unit suitable for use in liquid fuel tanks and by means of which signals may be imparted to liquid level indicators such as gauges.

An object of the present invention is to provide a combined suction line and liquid level sensing unit which is low in cost, convenient to instal in a tank and such as to present a base readily receiving a filter element as a part of the unit to filter fluid to be discharged from the tank.

The scope of the invention is defined by the appended claims; and the invention and the method by which it is to be performed are hereinafter particularly described with reference to the accompanying drawings in which:—

Figure 1 is a side view of an automobile fuel tank a portion of which is broken away showing the installation of a sensing unit representing one embodiment of the present invention;

Figure 2 is a view, drawn to a larger scale, of the sensing unit shown in Figure 1 with portions of the transmitter broken away and a portion of the top wall of the tank shown in section;

Figure 3 is a view drawn partly in section as viewed in the direction of the arrows 3-3 in Figure 2;

Figure 4 is a sectional view looking in the direction of the arrows 4-4 in Figure 2; 45 and

Figure 5 is a sectional view looking in the direction of the arrows 5-5 in Figure 2.

An automobile type fuel tank 10 has a top wall 12 with a discharge opening 14 reinforced by a stiffening ring 16. A support 18 forms a cover for the opening 14 and is attachable to the tank by means of screws 20 with a sealing gasket 22 interposed. The cover 18 is preferably an injection moulding of plastics material having a right angle portion 24 defining a suction passage. One side of the cover 18 has a tube-like projection or nipple 26 for attaching a suction line as indicated at 28. Depending from the main body of the cover 18 is a tube portion 30. A conduit 32 is pressed on the tube portion 30 and extends the passage from the portion 24 downwardly a substantial distance and below a metal base plate 34 which surrounds the conduit 32 and is joined to the cover 18 by means of three rods 36, 38 and 40.

The end of the rod 36 retained within the cover 18 is insulated thereby from the material of the tank 10 and constitutes a terminal. The other end of the rod 36 is reduced in diameter and held within an insulator bushing 42 pressed into the metal base plate 34. One end of the rod 38 is also held by the cover 18 and insulated from the tank to constitute a terminal similarly to the rod 36, but in this case the other end of the rod 38 is fixed directly to the base plate 34. The rod 40 is preferably made of glass-filled nylon or plastics material and has its upper end pressed into and concealed within the cover 18 and its lower end in a driving fit with the cover 34. The rod 40 also carries a resistance 44 wound thereon. One end of the resistance is elec-

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trically connected with the base plate 34 through a nickel silver ferrule 47. A second ferrule 48 is used at the other end of the rod 40 to anchor that end of the resistance 44.

Integral with the conduit 32 is a disk 46 having a peripheral flange 46' which provides a surface for closure and support of a Saran (Registered Trade Mark) mesh bag-like filter element 50 which is pinched or closed at its base 52. Preferably the proportions are such that the element 50 just contacts the bottom of the tank 10.

Slidable on the conduit 32 is a plastics float 54 having peripheral notches such as at 56 sliding on the rods 36, 38 and 40. The float 54 carries contact means 60 in the form of a spring ribbon one end of which slidably engages the rod 36 and the other the resistance 44.

The choice of plastics material for the conduit 32 and the cover 18 is conducive to low cost and yet provides a very satisfactory structure for firmly guiding the float 54 and supporting the filter element 50.

The upper end of the rod 36 provides a terminal for connection to a gauge 72 of any suitable type which is connected to a source of voltage such as battery 70. The base plate 34 is in conductive relation with the rod 38 and the upper end of the latter presents an exterior terminal for connection to ground 74.

Numerous equivalent instruments would serve to give an indication of float level in accordance with a correct signal imparted by the tank transmitter described above.

In the operation of the unit the variation in the supply of liquid fuel 80 in the tank 10 will cause the float 54 to rise and fall and this will cause a variation of the current passing through the resistance 44 and influence the reading of the gauge 72. The circuit will proceed from the gauge 72, down the rod 36 to the ribbon or contact means 60, along the latter to the resistance 44 and then to the base plate 34 and to the second metal rod 38 and then to ground at 74. In the claims the rod 38 is referred to as the second rod and the rod 36 as the one other rod.

When suction is applied by way of the pipe line 28 to the suction passage defined by the support 18 and the conduit 32, fuel will flow through the filter 50 and be suitably filtered simultaneously with the sending of the signal as to liquid level by the same unitary structure.

#### WHAT WE CLAIM IS:—

1. A liquid level sensing unit comprising three rods for depending into a container for the liquid, the first rod carrying a resistor, the second rod being electrically conductive and being connected at its lower end to the lower end of the resistor, the one other rod also being electrically conductive and being

parallel to the first rod, wherein a contact carried by a float provides a sliding electrical connection between the resistor and the said one other rod, and wherein the upper ends of the second rod and the one other rod are electrically connectable to a circuit including a gauge.

2. A liquid level sensing unit according to claim 1, comprising a support having a suction passage connectable to a suction pipe line, a conduit depending between said rods and communicating with said passage, an annular float slidable on said conduit, a metal base plate carried by said conduit towards the free ends thereof, and wherein said rods are each held at one end by said support, electrically insulated from each other, and at the other end by said metal base plate, said one other rod being electrically insulated from the base plate.

3. A liquid level sensing unit according to claim 1 or 2, wherein said float has peripheral notches receiving said rods.

4. A liquid level sensing unit according to claim 1, 2 or 3, wherein the sliding contact comprises a spring ribbon bearing at one of its ends on said resistor and at the other end on the one other rod.

5. A liquid level sensing unit according to claim 2, comprising an integral disc at the free end of said conduit for supporting a filter element for the liquid.

6. A liquid level sensing unit according to claim 5, comprising a Saran (Registered Trade Mark) mesh bag-like filter element.

7. A liquid level sensing unit attachable to a tank wall and including a support and a metal base plate, multiple rods and a conduit connecting said support and base plate in spaced relation, said support and conduit being made of plastics and cooperating to define a suction passage communicating at the lower end with a bag-like filter element, a float slidable on said conduit and having grooves each in registry with one of said rods for guidance, a resistance on one of said rods and having one end connected to said base plate, a second of said rods having a terminal at one end and its other end in conductive relation with said base plate, contact means carried on said float and slidable on said resistance and one other of said rods, and a terminal on said one other rod.

8. A liquid level sensing unit comprising a plastics cover attachable to a tank and including a filtering unit fixed in spaced relation to said cover by means of multiple metal rods and a plastics conduit, said conduit and cover cooperating to define a suction passage leading from one side of said cover to the interior of said filtering unit on the other side of said cover, a resistance on one of said rods, one end of said resistance being connected to a second of said rods, a float movable along said conduit and rods,

contact means carried by said float and slidable on said resistance and one other of said rods and terminals on said second and one other rods.

as hereinbefore particularly described and as shown in the accompanying drawings.

5 9. A liquid level sensing unit substantially

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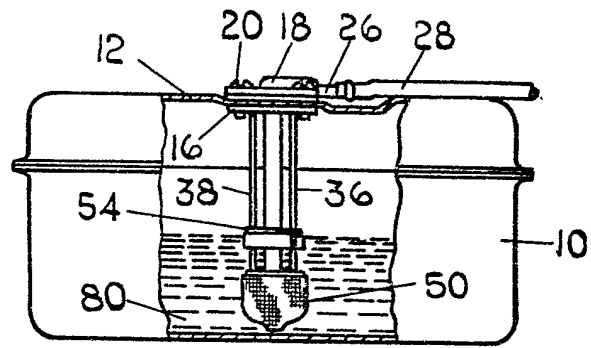


Fig. 1

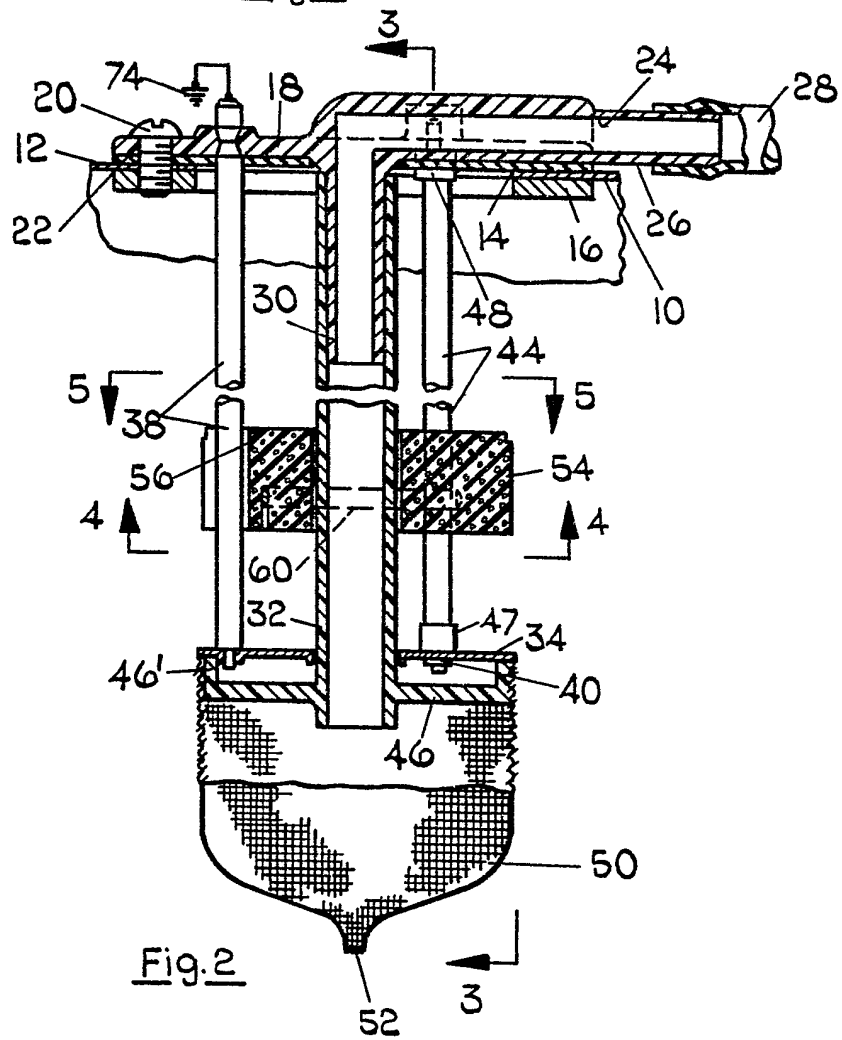


Fig. 2

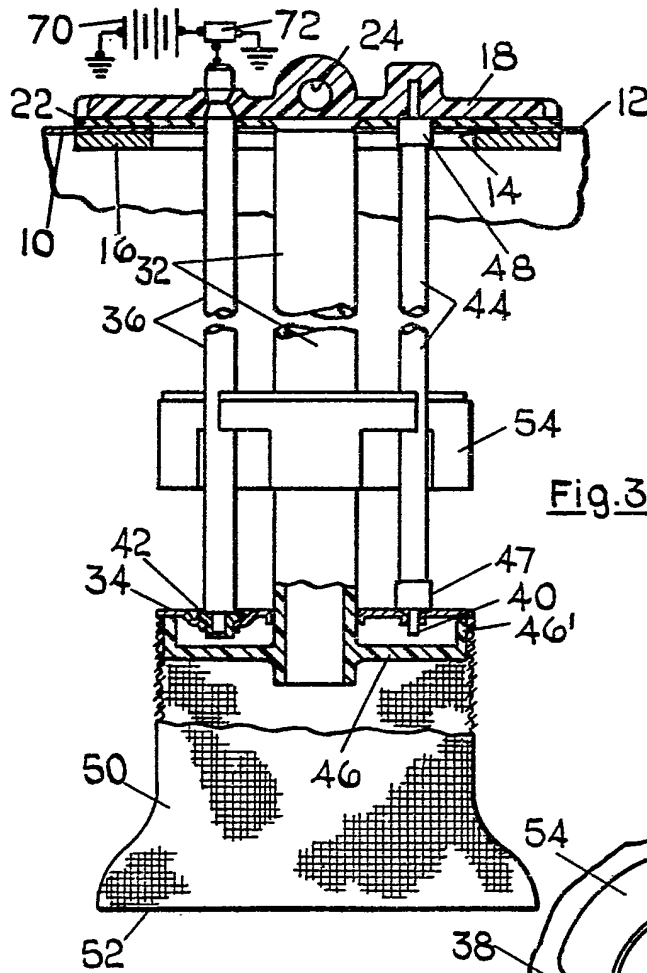


Fig. 3

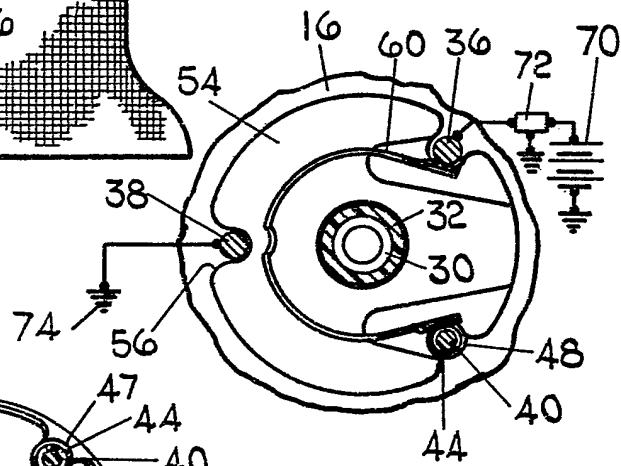


Fig. 4

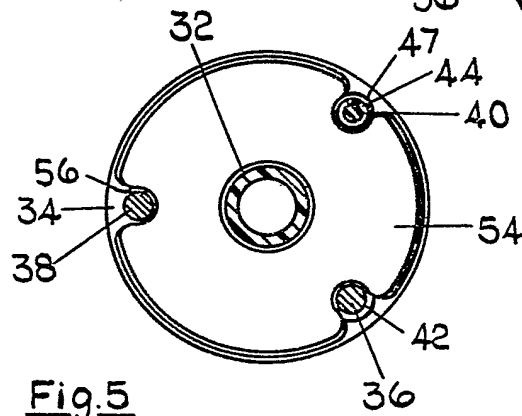


Fig. 5

